

Hazardous Air Pollutants

*Kentucky Environmental Quality Commission Indicators Program...
reporting on environmental and natural resource trends and conditions in the Commonwealth*

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*Prepared by:
Kentucky Environmental Quality Commission
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*EQC Environmental Indicators. . . reporting on
environmental trends and conditions in Kentucky*

Hazardous Air Pollutants

Toxic Air Releases in Kentucky*

In 2002, 1.25 billion pounds of Hazardous Air Pollutants (also known as air toxics) were released in the United States. That year just under 46 million pounds of hazardous air pollutants (HAP) were released in Kentucky, making the state the 12th largest emitter of hazardous air pollutants in the country.¹

The emission of toxic substances into the air can be damaging to human health and to the environment. Human exposure to these pollutants at sufficient concentrations and durations can result in cancer, poisoning, and rapid onset of sickness, such as nausea or difficulty in breathing. Other less measurable effects include immunological, neurological, reproductive, developmental, and respiratory problems. Pollutants deposited onto soil or into lakes and streams affect ecological systems and eventually human health through consumption of contaminated food.

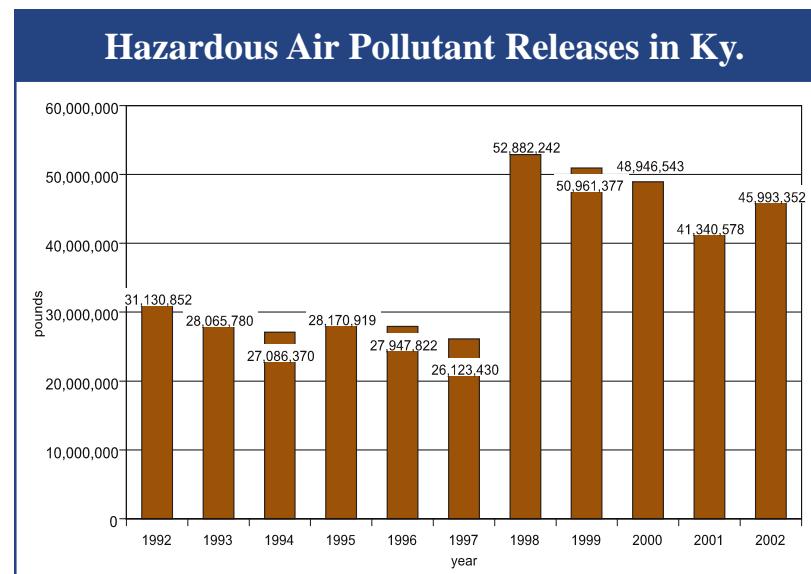
The Clean Air Act requires the U.S. Environmental Protection Agency to control 188 chemicals that have been classified as Hazardous Air Pollutants. ([List of HAP spreadsheet](#)). Most of these pollutants originate from sources related to human activities, including mobile sources (cars, trucks, buses), stationary sources (factories, dry cleaners, power plants) as well as indoor sources (building materials and cleaning products).² In addition to routine releases, sudden accidental air releases of toxics threaten many Kentuckians.

The principal tool to measure industrial toxic releases to the environment is the Toxic Release Inventory. Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA) in 1986 shortly after the Union Carbide chemical disaster in Bhopal, India killed thousands of people. The

Toxic Release Inventory was created in 1987 under EPCRA, and mandates the collection of data on releases and transfers of certain toxic chemicals from industrial facilities for public disclosure. TRI has expanded over the years to include additional chemicals and industrial sectors.

Reported hazardous air pollutant releases in Kentucky have remained constant at an average of 27.8 million pounds between 1992 and 1997. In 1998, however, changes were made in TRI reporting requirements. That year, the U.S. EPA added seven large industrial sectors to the TRI reporting database. The industrial sectors added included: metal mining, coal mining, electrical utilities that combust coal and/or oil, hazardous waste treatment and disposal facilities, chemical wholesale distributors, petroleum bulk stations and terminals and solvent recovery services.

The addition of these seven industrial sectors doubled the amount of toxic pollutants reported released to Kentucky's environment between 1997 and 1998. That year, 266 companies reported releasing 52.8 million pounds of hazardous air pollutants. A review of toxic air releases between 1998 and 2002 reveal emissions have declined by 13 percent. In 2002, 270 facilities reported releasing 45.9 million pounds of hazardous air pollutants.



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Sources of Hazardous Air Pollutants

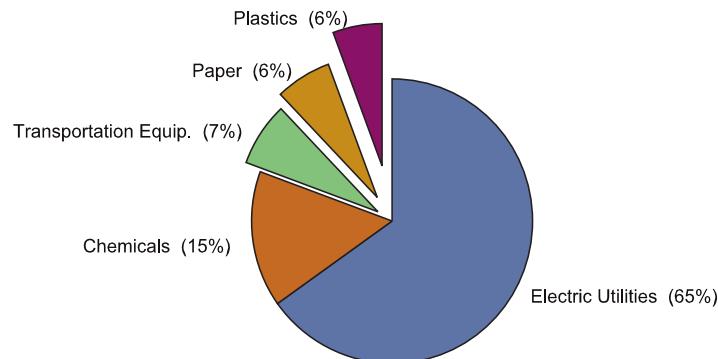
A handful of industries are responsible for the majority of hazardous air pollutants reported released into the air in Kentucky. During 2002, the largest reporting source of hazardous air emissions in the state was the electric utility industry, which was responsible for 65 percent (26.7 million pounds) of the toxics released to Kentucky's air.

Hydrochloric acid aerosols accounted for the largest single chemical released into the air by the electric utility industry (23.8 million pounds) followed by hydrogen fluoride (2.9 million pounds). East Kentucky Power Spurlock Station, in Mason County, was the largest power plant source, releasing 5 million pounds of hydrochloric acid aerosols in 2002. Since 1998, when electric utilities were first required to report their emissions, this sector has been the largest emitter of hazardous air pollutants. However, since 1998 this sector's overall air toxic releases have decreased by 9 percent.

The second largest source of hazardous air pollutant releases, to the air in Kentucky, was from the chemical industries group, with 15 percent of the total air releases or 6.3 million pounds. The chemicals primarily released by this industrial group were methanol (2.59 million pounds) followed by toluene (1.03 million pounds) and chloroprene (520,943 pounds). The largest source of methanol air releases to the air in Kentucky in 2002 was Celanese Ltd. in Calvert City at 2,456,920 pounds. The largest source of toluene for this group was American Synthetic Rubber in Louisville at 741,000 pounds. The largest releaser of chloroprene to the air in Kentucky, for this industrial group, group was DDE in Louisville at 520,759 pounds. They are responsible for 99.9% of all releases in the state. Overall, air releases by this industrial sector have increased 8 percent since 1999.



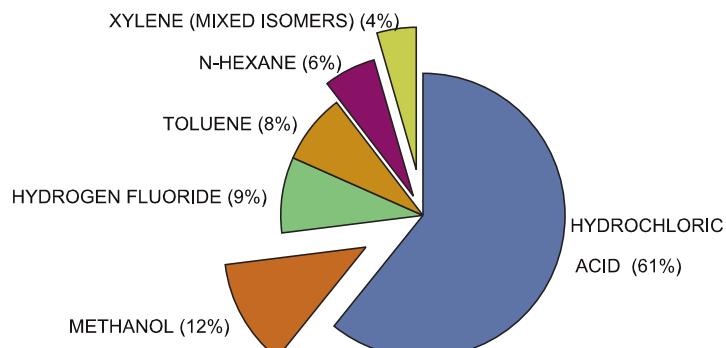
Sources of HAP by Industry in Kentucky



[Spreadsheet -- Hazardous Air Pollutants by facility.](#)



HAP by Chemical in Kentucky



[Spreadsheet -- Hazardous Air Pollutants by chemical and industry spreadsheet.](#)



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Monitoring Toxic Air Emissions in Kentucky

Eighty six percent of the 45.8 million pounds of air toxic releases occurred in 15 counties. **The top five counties with toxic air releases were:**

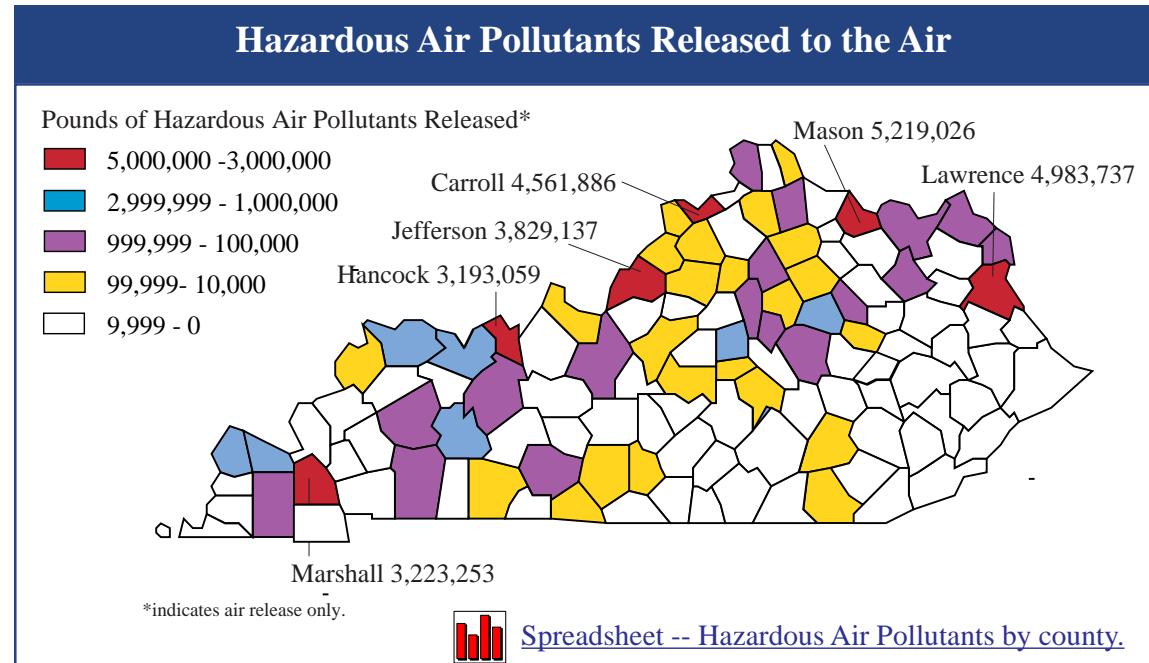
- Mason (5.2 million pounds)
- Lawrence (4.98 million pounds)
- Carroll (4.56 million pounds),
- Jefferson (3.83 million pounds)
- Marshall (3.22 million pounds)

The Kentucky Division for Air Quality operates 143 monitors which sample air quality in 31 counties. Twelve of those monitors sample for toxic air pollutants. Those monitors are primarily located in areas with the greatest industrial toxic air emissions. The Division is also in the process of establishing a mercury monitoring network with approximately 15 monitoring locations.^{3,4} [Spreadsheet -- Monitors by County](#)

The goal of toxics air sampling in Kentucky is to address the concerns posed by air toxics emissions by characterizing ambient levels, prioritizing the focus of programs and addressing the impact on public health and the environment. In Kentucky, the first air toxics sampling was at the National Electric Coil site in Harlan County in 1989. Since that time, the Division for Air Quality has taken more than 10,500 samples for volatile organics, semi-volatile organics, metals, dioxin/furans, PCBs, carbonyls, and acidic/basic gases. Major toxics studies have also been conducted in Calvert City, Tri-State Geographic Initiative Kenova cluster, Tri-State Geographic Initiative Greenup cluster, Urban Trends Study and West Louisville Air Toxic Study. Other toxics studies have included Brooks Elementary, Franklin County Tire Fire, Fort Wright/Taylor Mill, Boyle County rail car fire, Georgetown, and Owingsville PB Station.



The Kentucky Division for Air Quality reports that it will continue to operate four air toxic monitoring sites in Calvert City and the tri-state area. The division plans to also resume toxics sampling at urban trends sites in Lexington, Covington, Owensboro, Paducah and Bowling Green. The division will also continue the operation of its rural toxic trends monitoring site in Hazard as well as add a new site in Ohio County. The state will also add new air toxics monitoring sites in Carroll, Gallatin and Hardin Counties.



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Persistent, Bioaccumulative Toxic Pollutants

The presence of a toxic chemical does not necessarily mean that people are being exposed to a potential health hazard. People have to come in contact with the chemical in sufficient amounts before any health effects can occur. Before a chemical can effect human health, there must be a complete "exposure pathway." This means that there must be a route by which a toxic chemical can get into the body at levels that can cause harm.

The most common routes of exposure to toxic pollutants are skin contact, inhalation, and ingestion. In addition, a fetus can be exposed to toxic chemicals that have entered its mother's body and have passed through the placenta. The amount of chemical and length of time of exposure are also important in determining whether a public health threat is present. Brief exposure to a small amount of a highly toxic material can sometimes be as dangerous as exposure to a large amount of a low toxicity material for a long period.

The U.S. EPA has identified certain chemicals that pose some of the greatest risks to public health. These chemicals, called Persistent Bioaccumulative Toxics (PBTs) are highly toxic, long-lasting substances that can build up in the food chain to levels that are harmful to human and ecosystem health. They are associated with a range of adverse human health effects, including effects on the nervous system, reproductive and developmental problems, cancer, and genetic impacts.⁵

The populations at greatest risk, especially to PBTs such as mercury, dioxins, and Polychlorinated Biphenyls (PCBs), are children and the developing fetus. While the use of some persistent toxins, such as PCBs, has been banned for more than 30 years, their presence remains in land and water across Kentucky. For example, PCBs have found their way into fish resulting in three fish consumption advisories in the state. Other toxic pollutants have been detected in drinking water.

For the year 2000, TRI was expanded to include 16 PBT chemicals and four PBT chemical compound categories, which are subject to reporting. In Kentucky, 1.2 million pounds PBT chemicals were reported released by 162 facilities in 2002, of which 65,859 pounds were reported released to the air. This was a 7 percent increase over 2000 levels. The greatest PBT air releases during 2002 were in Henderson County (16,465 pounds) followed by Woodford County (9,143 pounds) and Hancock County (7,128 pounds).

A significant portion of the PBT total releases were comprised of lead and lead compounds released to the land. One hundred and forty eight industries reported that 1.11 million pounds of lead and lead compounds were released to the environment which is a seven percent increase over 2000. Polycyclic aromatic compounds were the PBT chemical with the largest release to the air, with 27 facilities releasing 29,681 pounds in 2002 which is a decrease of 47 percent from 2000. Some companies have made significant efforts to reduce PBTs, primarily polycyclic aromatic compounds, including Carbide/Graphite Group in Calvert City and Alcan in Henderson.

PBT Air Releases		
Chemical	2000	2002
ALDRIN	0.57	0.11
BENZO(G,H,I)PERYLENE	171	130
CHLORDANE	0.74	0.88
DIOXIN AND COMPOUNDS	0.08	0.07
HEPTACHLOR	0.48	0.70
HEXAChLOROBENZENE	0.11	7.39
ISODRIN	0.05	0.11
LEAD	13,118	12,943
LEAD COMPOUNDS	17,141	19,368
MERCURY	1,631	245
MERCURY COMPOUNDS	3,648	3,481
METHOXYCHLOR	0.22	0.31
PENTACHLOROBENZENE	0.00	0.00
POLYCHLORINATED BIPHENYLS	18.37	0.16
POLYCYCLIC AROMATIC COMPOUNDS	56,133	29,681
TOXAPHENE	0.62	0.36
TRIFLURALIN	0.22	0.16
Total	91,863	65,859



[Spreadsheet -- PBTs by facility and county](#)

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OSHA Carcinogens and Other Studies

EQC also reviewed TRI chemicals that are classified as carcinogens under the requirements of Occupational Safety and Health Administration (OSHA). OSHA carcinogens have a 0.1 percent (de minimis) concentration limit instead of 1 percent used for other TRI chemicals. Amounts of TRI chemicals present below the 0.1 percent concentration limit in mixtures do not have to be reported. There are 178 chemicals that EPA list as OSHA carcinogens, 52 of which are released to the air by Kentucky industries.

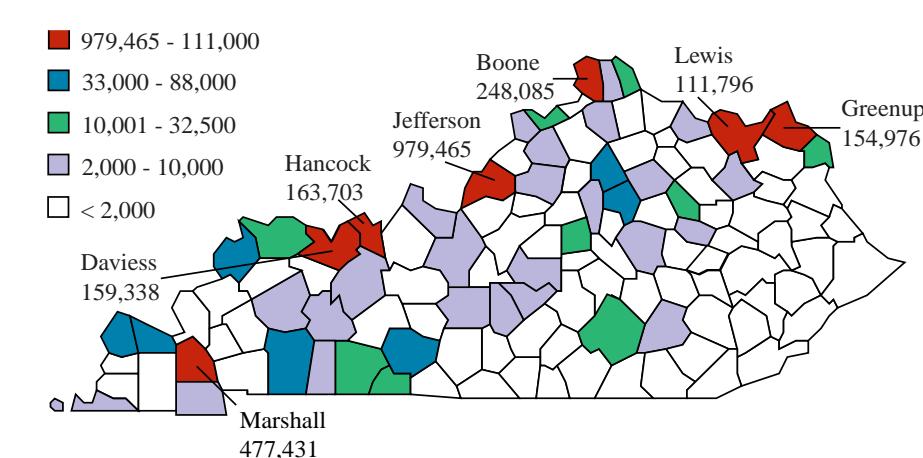
The total industrial air emissions of OSHA carcinogens for 2002 was 3,094,240 pounds, which is a seven percent decrease from 2000 levels. The most commonly released OSHA chemical to the air in Kentucky was styrene (644,517 pounds).⁶ Jefferson County had the largest air releases in 2002 at 979,465 pounds, followed by Marshall County with 477,431 pounds, and Boone County with 248,085 pounds.

Recently, Jefferson County identified toxic air pollutants that were present in levels that exceeded the health risk goal (1 in 1 million lifetime cancer risk). The Jefferson County Air Pollution Control District identified [17 chemicals](#) with the greatest risks including:

- 1,3-butadiene, used in the manufacture of synthetic rubber and found in motor vehicle emissions. It's known to cause cancer in people. At high levels it can cause brain and nerve damage, and it has caused kidney and liver disease in animals.
- Acrylonitrile, used in the manufacture of synthetic rubber. It's suspected of causing cancer in people.
- Chromium, found in emissions from coal-burners and possibly other industrial sources. Its most toxic form is known to cause cancer in people and birth defects in animals.
- Carbon tetrachloride, an industrial solvent. The EPA has classified it as a probable human carcinogen.

A statewide review of those 17 toxic chemicals found a total of 933,146 pounds released into the air during 2002.⁷ Jefferson County accounted for 28 percent of the total releases at 259,357 pounds, followed by Fayette County (82,488 pounds) and Marshall County (74,169 pounds). Since 1998, the amount of these 17 chemicals released into Kentucky's air has decreased 73%, primarily due to the discontinued use of dichlormethane which represented 58 percent of the emissions in 1998.

Pounds of OSHA Carcinogens Released to the Air 2002



Source: 2002 USEPA Toxic Release Inventory Database.

Spreadsheet --OSHA carcinogens releases by county



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Regulating Toxic Air Pollutants in Kentucky

The Clean Air Act is the law which drives most federal regulation of air quality, and the U.S. Environmental Protection Agency is charged with developing and enforcing the regulations. Two groups of air pollutants are regulated under the Clean Air Act. The first group, called the Criteria Pollutants, are regulated under Title I of the Clean Air Act. There are only six in this group. These pollutants — ozone, carbon monoxide, nitrogen dioxide, sulphur dioxide, lead, and particulate matter (PM) — are found in relatively large quantities in our lower atmosphere, particularly in populated, urban areas. They threaten human health and the environment across broad regions of the country. The second group are the Toxic Air Pollutants — also called “hazardous air pollutants.” The regulatory program for the “hazardous air pollutants,” in the 1990 amendments required EPA to identify categories of the major industrial sources of air toxics and then develop “maximum achievable control technology” (MACT) standards for each “source category.” These standards are to be based on the best control technologies that have been demonstrated in these industrial categories. State and local air pollution agencies have the primary responsibility to make sure industrial plants meet the standards.

In setting the MACT standards, EPA looks not at health risk, but at pollution control equipment and pollution prevention methods, such as substituting nontoxic chemicals for toxic ones currently in use. Eight years after each MACT standard is issued, EPA must assess the remaining health risks from the source categories. If necessary, EPA may implement additional standards that address any significant remaining risk. EPA’s published list now contains 175 categories of industrial and commercial sources that emit one or more toxic air pollutants.

Kentucky currently regulates toxic emissions through its air quality standards. There are no ambient air quality standards for air toxics in Kentucky. Efforts, however, are underway to begin to more fully regulate toxic air emissions in Kentucky. The Environmental and Public Protection Cabinet convened a task group in 2004 to develop a toxics strategy for the state. The workgroup is comprised of 10 individuals representing the public interest, private, and industrial sectors. The group has met five times to discuss legal issues, historical data-gathering efforts, goals of a state program and implementation of a program and hopes to finalize its recommendations by this summer.

The Louisville Metro Air Pollution Control District is also developing an air toxics program known as Strategic Toxic Air Reduction (STAR). The program initially seeks to reduce the levels of 18 toxic chemicals that have been shown to exceed the federal cancer risk levels and will later address an additional 19 chemicals on a secondary list. The STAR program will:

- Require 171 companies, that are major and moderate emitters, to determine if emissions exceed the health risk goal for the first 37 targeted chemicals.
- Set a timetable, based on the companies’ emission levels and the chemicals released, between 2007 and 2010 for companies to reduce toxic emissions to meet the health risk goal.
- Require companies to prove they are using the best available technology to lower emissions if they cannot reduce the amount of the first 18 toxic chemicals.
- Use state-of-the-art air monitoring equipment to ensure modeling accuracy.⁸

The public comment on the regulatory STAR program ended on Feb. 14, 2005 and the Metro Air Pollution Board is currently reviewing comments on the proposed regulation.⁹ Following consideration of all public comments, the Metro Air Pollution Board has many options including approval or disapproval of the proposed regulation; modify the proposed regulation or seek additional public comment. Once the Board approves the new regulation, APCD staff will begin the implementation process. A decision on the regulation is expected this summer.



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Endnotes

- * All TRI data collected from the TRI Explorer database is from August or December 2004 and these numbers may not exactly match data from the current system because TRI data is updated on a periodic basis.
- 1. USEPA, Toxic Release Inventory TRI Explorer. 2002 Data Update as of August 2, 2004.
- 2. USEPA, Technology Transfer Network Air Toxics Website. <http://www.epa.gov/ttn/atw/pollsour.html>
- 3. Kentucky Division of Air Quality Website. <http://www.air.ky.gov/programs/monitoring/>
- 4. Kentucky's Air Toxics Program PowerPoint Presentation Prepared by John Lyons Director Kentucky Division for Air Quality January 27, 2005.
- 5. U.S. EPA PBT website. <http://www.epa.gov/pbt/>
- 6. USEPA, Toxic Release Inventory TRI Explorer. 2002 Data Update as of August 2, 2004.
- 7. USEPA, Toxic Release Inventory TRI Explorer. 2002 Data Update as of August 2, 2004.
- 8. Mayor's Air Toxics Reduction Proposal Protects Citizens' Health, Improves Louisville's Air. Press release, Mayor Jerry Abramson, Louisville. September 9, 2004.
- 9. STAR program webpage. <http://www.apcd.org/star/>

Chart Notes

Sources for all charts: USEPA, Toxic Release Inventory TRI Explorer. 2002 Data Update as of August 2, 2004.

Chart 1. Hazardous Air Pollutant Releases in Kentucky.

Chart 2. Sources of HAP by Industry in Kentucky.

Chart 3 HAP by Chemical in Kentucky.

Chart 5 Hazardous Air Pollutants Released to the Air. Source:

Chart 6 PBT Air Releases.

Chart 7 Pounds of OSHA Carcinogens Released to the Air 2002.

Additional Sources and Notes

- American Synthetic Rubber Study CONSULTING REPORT, Prepared for the Louisville Metro Air Pollution Control District by the Kentucky Institute for the Environment and Sustainable Development, University of Louisville.
- FINAL REPORT WEST LOUISVILLE AIR TOXICS STUDY RISK ASSESSMENT. Prepared by: Sciences International, Inc. 2003.
- Courier Journal, Continuing Coverage of Air Toxics in Louisville. <http://www.courier-journal.com/cjextra/2003projects/toxicair/>
- USEPA, Taking Toxics Out of the Air.
- West Jefferson Task Force Website. <http://www.louisville.edu/org/wjcctf/>

Hazardous Air Pollutants

West Jefferson Task Force Chemicals

1,3-BUTADIENE
1,4-DICHLOROBENZENE
ACRYLONITRILE
ARSENIC
BENZENE
BROMOFORM
CADMIUM
CARBON TETRACHLORIDE
CHLOROFORM
CHROMIUM
ETHYL ACRYLATE
FORMALDEHYDE
METHYLENE CHLORIDE
NICKEL
TETRACHLOROETHENE (TETRACHLOROETHYLENE)
TRICHLOROETHENE (TRICHLOROETHYLENE)
VINYL CHLORIDE

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[OSHA carcinogens releases by county](#)

[Seventeen West Jefferson Task Force Chemicals](#)